

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
22 September 2005 (22.09.2005)

PCT

(10) International Publication Number
WO 2005/087369 A1

(51) International Patent Classification⁷: **B01J 29/00**,
37/04, 35/02, 20/10, 20/28, 35/10

(21) International Application Number:
PCT/CA2005/000406

(22) International Filing Date: 16 March 2005 (16.03.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/553,121 16 March 2004 (16.03.2004) US

(71) Applicant (for all designated States except US): **THE GOVERNING COUNCIL OF THE UNIVERSITY OF TORONTO** [CA/CA]; Simcoe Hall, 27 King's College Circle, Toronto, Ontario M5S 1A1 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **WHITNALL**, Wesley [CA/CA]; 142 Ellsworth Avenue, Toronto, Ontario

M6G 2K6 (CA). ASEFA, Tewodros [CA/CA]; 2150 Mackay Street, Apt. 1103, Montreal, Québec H3G 2M2 (CA). OZIN, Geoffrey, Alan [CA/CA]; 63 Gormley Avenue, Toronto, Ontario M4V 1Y9 (CA).

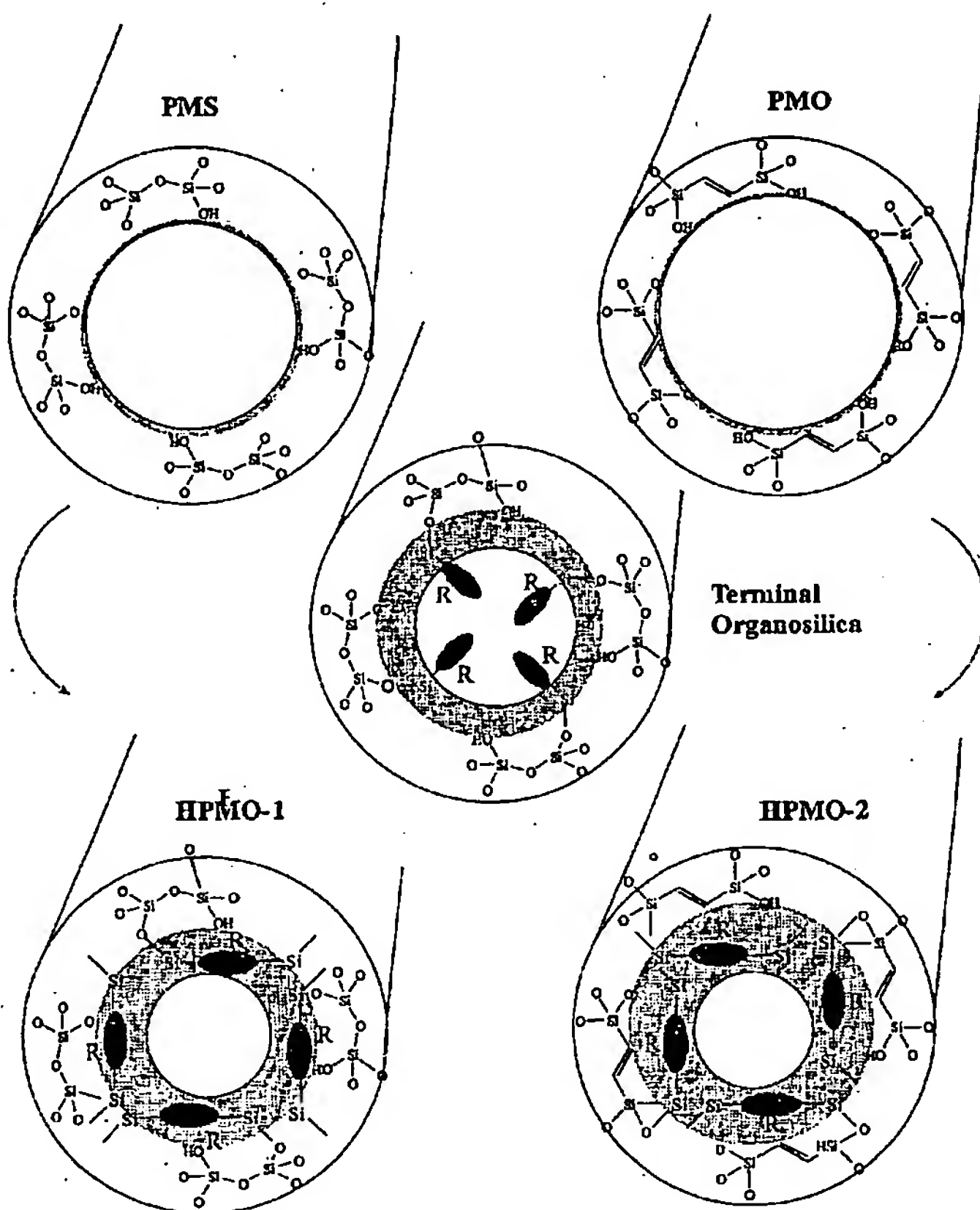
(74) Agent: **HILL & SCHUMACHER**; 87 Falcon Street, Toronto, Ontario M4S 2P4 (CA).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: **HYBRID POROUS ORGANIC-METAL OXIDE MATERIALS**



(57) Abstract: The present invention provides a synthetic strategy for creating a new class of materials called hybrid mesoporous, macroporous, or mesoporous-macroporous organometaloxide materials, exemplified but not limited to hybrid mesoporous organosilicas. This strategy involves taking a pre-assembled mesoporous material having a porous framework and then attaching an organic, inorganic or biological guest molecule to the pore walls of the framework material through two or more chemical linkages. The unusual combination of inorganic and organic components organized into a material with mesoscale porosity and having bridge bonded organic, organometallic, or biological functionalized surfaces suggests a myriad of uses for these composite materials, such as the controlled release and uptake of chemicals and drugs, chiral separations and catalysis, electronic printing and microelectronic packaging, thermal and acoustical insulation.



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.